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—EDITOR.

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AGRICULTURAL JOURNAL

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VOL. 16.] MARCH, 1945. [NO. 1

THE IDEAL INSECTICIDE.

SOME of the results achieved, chiefly against mosquitoes, with the new insecticide DDT were touched upon in our issue for last September, but in view of its exceptional powers further information should be of general interest as one day stocks will be available in Fiji.

Experiments had been carried out for some time both in England, prior to September, 1942, and in the United States with this fine white powder and it was mentioned in the London press last August that Allied troops in the North African campaign had their shirts impregnated with a solution of DDT so as to keep the men free from typhus-spreading lice. It seems that it was the Germans who initially exploited one of their fellow countrymen's seventy-year-old experiments by making a preparation which was dusted on their troops' bodies. The capture of one of the *Herrenvolk*, who was free from lice and flea bites, directed attention to the fact that his body had been dusted with a soft white powder and it was apparently from this solitary prisoner that there followed the wholesale dusting of the bulk of the civilians in Naples, thereby preventing a typhus epidemic early last year.

As an insecticide against plant pests results are equally satisfactory, American workers having demonstrated that a five per cent spray and dust " were equal or far superior " to derris and pyrethrum. The insects tested were leaf beetles, pea weevils, cabbage loopers and other caterpillars, leaf hoppers and a harlequin bug allied to our cotton harlequin bug *(Tectocoris)*. Other successful tests (some using 10 per cent) made against the cotton boll worm (a pest in Fiji on tomato, tobacco and maize), shield bug, thrips, Japanese beetle (not the local *Adoretus)* and *Nezara* or green vegetable bug, showed the large number of insects killed by this compound. Failures were with the green flies (aphids), boll weevil, grasshoppers, bean beetle and a fruit fly, the last yielding to tartar emetic rather than DDT. Most of the above data are abstracted from a recent issue of the *Journal of Economic Entomology*.

Against house flies a 5 per cent solution in kerosene gave a reduction of 95 per cent, and milk barns thus treated had lower populations of flies for several months. Similarly with the stable fly of horses there was a 100 per cent kill when used as a spray and a deposit that was poisonous to the flies for a few days. Cockroaches, fleas, lice and bed bugs are also susceptible.

Two other uses are in paints and on clothing, it being found that when mixed with an oil-bound water-paint DDT continued to kill flies settling on woodwork up to two months, and to be effective for six to eight weeks on clothes even when they had up to six or eight launderings.

Finally there is evidence that DDT may be useful against ants, termites (" white ants") and to prevent beetles from boring into paper bags in which cereals and other dried food products are packed. Enough has been recorded to show that this preparation may within a generation reduce the status of the economic entomologist to something like that of the village blacksmith or the maker of grandfather clocks.

—R.J.A.W.L

COPRA PRODUCTION IN NEW GUINEA.

By
C. R. VASEY, Agricultural Assistant.

As there has been so much said and written recently about copra and copra grading in Fiji, it might be of interest to consider the methods and practices of the industry in New Guinea. This is of course before the war, because soon after the war started copra from New Guinea was like copra from Fiji, a drug on the market. It was unsaleable and planters were collecting the nuts, splitting them open and throwing them into the sea, rather than let them germinate and foul the plantations.

Grading.

Grading was carried out by the planter himself. The grades were firstly No. 1 Hot air, and this was a really first class product, being a clean white sample, large pieces, well-dried, free from mildew, weevil infestation, scorched or " stewed " pieces. Sacks containing this grade were branded with the planter's brand in green. This grade naturally commanded the highest price.

Next came No. 2 Hot air which was in sacks branded in black and contained a good quality of copra though usually this consisted of either scorched or " stewed " copra, also a large percentage of small pieces. For many years the price for this copra was £1 lower than that for No. 1. However in 1939 the price paid by the trading firms was increased to within 2/6 of the price paid for No. 1 copra. The firms said that because the quality of the copra had improved and only a small percentage was No. 2, it was found possible to increase the price.

" Sun dried " was the third grade of copra, also branded in black with the addition of a black " X ". The same price was paid for this as for No. 2 and the price was increased too in 1939 to within 2/6 of No. 1. Such a very small percentage of copra was sun dried that it was found possible to mix with No. 2 for shipment overseas.

Smoke copra was the lowest grade and was the product of the smoke curing houses. The price for this copra was £1 under No. 2. Smoke drying was not generally practised, but some planters resorted to it when they had more nuts than their hot air driers could cope with. Sacks of smoke copra were branded in red.

Inspection.

The copra was inspected at the ports of Rabaul and Kavieng by inspectors of the Department of Agriculture. If a planter graded his product a high grade and on inspection it was found to contain a large percentage of low grade copra, the whole consignment would be considered as low grade copra and purchased accordingly. A planter could, if he wished, on being informed that his copra had been regraded at a lower grade, send in some men and have them sort over the copra separating it into two or more grades.

Hand sorting was practised on plantations that did not have efficient kilns. Labourers who were injured or recuperating from illness and unable to work in the plantation were given the job of sorting.

Weevily, mouldy, sour-smelling copra such as one sees occasionally in the stores in Suva would not have been purchased at any price. A planter trying to sell such copra would have been told to take it home again. A planter who consistently sent in low grade copra was visited by a member of the Department of Agriculture, who, after examining the planter's methods, gave advice as to how the quality of his copra might be improved.

Driers.

Driers or kilns were of the " hot air " type. Different plantations had different styles but they all had the one basic principle which is a furnace-heating air that passed through the copra and so removed the moisture.

The commonest style was a long building with a firebox made of firebrick at either end. In old kilns these boxes were built with semi-circular or arched top inside the building. The practice was given up however because the bricks were liable to fall from the arch and the risk of fire was too great. Modern driers or driers that have been modernized have the fire-boxes outside the building. These boxes were built of firebrick about 8 ft. long, 4 ft. high and 3 ft. 6 in. wide. Some had covers made of specially cast steel plates, 3 ft. by 1 ft. 6 in. by 1 in. thick. These steel plates were laid on top of the brick walls of the fire-boxes and sealed with asbestos rope. These plates did an excellent job and were practically everlasting but the cost was high : £35 a set for two boxes, as they had to be cast in Australia. Concrete slabs 4 in. thick made from volcanic sand have been used by the writer in place of steel plates. The slabs served the purpose very well, but of course had not the life of the steel ; eighteen months satisfactory service was obtained at only a fraction of the cost.

From each firebox a steel pipe ran the length of the building and ended in a smokestack. This pipe varied in diameter from 10 to 16 in. according to the size of the drying chamber to be heated. The walls of the driers were concrete, up to 4 ft. and from there up corrugated iron. Usually the walls were double, that is the iron was nailed on either sides of the studs and the space in between packed with some insulating material. Around Rabaul pumice was commonly used as this was easily obtained from the base of the volcanoes in Rabaul Harbour.

Lengths of 3 in. downpiping were let into the concrete walls about 2 ft. apart for cold air inlets. These air pipes were so placed that they ended underneath the heating pipes from the fireboxes so that cold air entering the kiln was immediately heated. Large ventilators were placed in the roof to draw off the moisture-laden air.

The copra was spread on trays of copra wire running across the building. These number in a large kiln four per room and six or more rooms depending on the size. In some kilns " fixed beds " were used in place of trays as these get broken very easily.

A kiln operated by the writer was built in 1937 at a cost of £550 (Australian). This kiln had 16 in. heating pipes, eight 15 in. ventilators in the roof insulated with pumice and a capacity of 30 cwt. of green copra. This kiln would dry copra in 18 to 20 hours without any trouble at all and without scorching. The sample of copra turned out was perfect and there was never any need for sorting. Irrespective of the weather conditions outside, the temperature within the kiln would remain constant.

Twenty to twenty-two hours was considered the usual drying time and any kiln that could not turn out dry copra in that time was considered a most inefficient kiln.

Another type of hot air kiln was the " Windsor " drier. These kilns were small, being short and narrow, holding at maximum capacity 16 cwt. of green copra. The heating unit for this kiln was a stove situated in a hole about 7 ft. deep underneath the centre of the kiln. On top of the stove was

a hot air chamber from which radiated large pipes carrying the heated air out under the trays. These kilns were not very popular for a number of reasons :—

1. Risk of fire was great, because sometimes the top of the stove burnt out and flames entered the air chamber and sparks and smoke issued from the air pipes.

2. They did not turn out a very high class of copra as ventilation was poor.

3. The stoves were made of cast iron and came from America. Firebox and plates would burn out and it was difficult to obtain spares.

Sun drying was not widely practised on the plantations because of the uncertainty of weather conditions. Even in the dry season, from April to October, the weather was never certain enough to turn out a first class product consistently. Rainfall on New Britain was around the 100-inch-a-year mark while in other areas it was higher still.

In the villages the natives did some sun drying but not very successfully. Latterly they erected their own small hot air kilns. These were built as community affairs costing about £80 each, holding 6 to 8 cwt. green copra and turning out an excellent product.

Smoke kilns were built of bush materials with thatch roof and walls. A pit some 2 ft. deep was dug inside, and on a wire bed 5 ft. above the pit, the copra was spread. Slow fires were lit in the pit and the smoke rising passed through the copra slowly drying it. Five to six days was the usual drying time in a smoke house. The product was dark in colour and of a shrivelled nature. It was a fairly common occurrence for these kilns to be destroyed by fire.

Fuel for all types of driers was " skins ", i.e. nuts that have been split open and the meat taken out, and a plentiful supply was kept on hand in a shed to guard against wet fuel in rainy weather. Each kiln would have two firemen, one for the day and one for the night.

Working the Plantation.

On efficiently run plantations the nut collecting line of labourers would get round the whole plantation in a month. This meant that the copra was made from only fresh nuts, essential for the production of good copra. Nuts that had germinated were discarded and fed to the pigs, of which most plantations had a supply for ration purposes. The daily task of a nut collector was 1,500 nuts collected and stacked on the plantation roads. These nuts were then carted by bullock carts to a central area where the driers were located. If the supply of skins for fuel was sufficient, the nuts would be cut in the plantation and only the green copra carted in.

Each copra cutter had a task of 4½ cwt. of green copra a day which he would finish round about 2 p.m. He would then remove from the kiln the dried copra that had been placed in there the day before. After weighing his bags of green copra, he would spread it on the trays in the kiln and finish for the day at about 4.30 p.m.

The most serious weed to the planter was the noxious grass *Imperata arundinacea*, commonly known in New Guinea as " kunai." This grass is similar to *Imperata cylindrica* var. *Koenigii*, known in Fiji as " Ji "

Even from mature trees the yield of nuts was markedly decreased if the land was overrun with kunai. The surest method of guarding against kunai was to get the ground covered by a creeping legume such as *Calopogonium mucunoides* or *Centrosema pubescens*—probably the latter would be better as it would be longer-lasting.

Yields.

Good palms frequently yielded more than 100 nuts, but 50-60 per annum was considered fair average, and with 50 trees to the acre, this meant about ½ ton of copra per acre (5,000 nuts to the ton of copra). Plantations have been known to produce on an average ¾ ton per acre for many years.

The cost of copra production from field to the bag was about £3 10s. per ton. This figure represents the actual costs of native labour and bags required. " All in " costs varied considerably, but on the average were about £6 10s. Figures for New Guinea compared very favourably with the Federated Malay States, where on a proprietary estate costs had been worked out at £11 per ton f.o.b. Singapore.

New Guinea's output of copra in 1938-1939, latest figures available, was 73,345 tons valued at £727,949, from an area of 102,483 hectares of palms. (Data from Report of Mandated Territory of New Guinea to League of Nations.)

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EXTRACT.

SOILS AND AGRICULTURE.

CONTRARY to the common opinion, African soil is less fertile than that of northern latitudes. It calls for special treatment in the renewal of fertility by bush fallowing or manuring. We must no longer be satisfied with the bare subsistence agriculture which has caused so much poverty and distress under primitive conditions.

If we are to avoid the " dust bowl " conditions of the U.S.A. we must learn to conserve fertility on the scale practised in China for the last 4,000 years. To-day we possess scientific knowledge to improve on that practice.

Improved hygiene is lengthening the individual's span of life in the Colonies and elsewhere. Food production must expand *pari passu* with extended existence. A definite policy calculated to maintain soil fertility and extend arable areas must be adopted. The need for an increased consumption of protective foods necessitates a new orientation of soil conservation policy. The work of the soil chemist assumes additional importance, and the extension of soil surveys to cover whole countries becomes a vital requirement.

The choice of a crop must be dictated by considerations of the proper use of the land for soil conservation. Repeated cultivation of one product must cease, being as harmful to the soil as its exclusive consumption is to the human body. Nature calls for variety in both cases. Since animal as well as vegetable life is expressed in many forms, it requires diversified foods.

Since it is a primary duty of a Government to study the relation of agriculture to world economy, any improvement in living conditions must arise out of the close co-ordination of each department concerned with every phase of farming and animal husbandry. The appointment of a scientific co-ordinating committee in each Colony should be a first step in this direction.

—A. WIGGLESWORTH in *Crown Colonist*, December, 1944.

HOW TO MAKE A COMPOST HEAP OR MANURE FROM GARDEN RUBBISH.

By
H. R. SURRIDGE, BSc., A.R.C.Sc. (I.), Agricultural Officer.

It is stated that for this year, 1945, at least, no blood and bone manure will be available from New Zealand or Australia for use in Fiji. This manure is a most important one for market gardeners and vegetable growers, therefore the lack of it will result in lower returns from the gardens, commercial or private, unless steps are taken to endeavour to substitute other materials.

The easiest general manure to replace as far as possible blood and bone manure is compost which all gardeners can make from all garden refuse ; if started now compost would be ready in about three months time. A well-cultivated soil gives the best cropping results when it contains plenty of organic matter. The regular application of some form of organic manure improves the tilth, temperature and water-holding capacity of the soil and enables the best use to be made of such other fertilizers as are obtainable. Coarse manures can be used to open up heavy soils while well-rotted manures are best for sandy soils.

Compost making requires little time, labour or expense and has advantages over green manuring, i.e. the digging in of raw vegetable waste. Any plant refuse, green or otherwise, can be used for making compost provided it is not obviously diseased. Included are leaves, grass cuttings, lawn mowings, the haulms of peas and beans, green tops of root vegetables not normally used, etc. The conversion of this waste into good compost will help to make good some of the benefits normally given by applications of blood and bone manure.

Composting is based on the fact that if the above refuse, together with air and water, are brought together in the right proportions, fermentation will ensue bringing about the decomposition or rotting of the vegetable matter. Composting can be hastened by the addition of animal manure such as cow, horse or pig manure, or bird guano.

Any very fibrous matter like hard stems should be chopped up into very short lengths to enable them to rot down together with the remainder of the heap.

To maintain a supply of air to the compost heap it is helpful to build the heap over a bundle of brushwood the ends of which should protrude beyond the edge of the compost heap.

How to make the Heap.

Prepare a site on a piece of ground not required for cropping and preferably in a shady place, allowing sufficient room in which to turn the heap over. Layers of material are now laid as follows :—

1. A layer of well-mixed vegetable refuse about 6 to 9 inches thick ; if dry and long, moisten it and then firm it well down ; the more broken it is the better, but if green and wet lay it on loosely.

2. Now lay on about 2 inches of animal and bird manure, of any kind or kinds available, wood ashes, and water with liquid manure.

3. At each foot or so of material make a layer of coral sand 1 or 2 inches thick ; this will assist the rotting down and make the compost richer.

4. Repeat this type of layer until the heap is 3 or 4 feet high when a fresh heap should be started.

Care of the Heap.

The more slowly heat is generated in the heap the longer it will take to break down, hence care is required to compact the heap sufficiently to make the temperature rise rapidly and then decline about 3 to 6 weeks later. After this the heap should be completely turned over to complete the rotting of all the material. A heap which remains fairly cool should be left from 6 to 12 weeks before being turned over. Turning over should be done so that the outside unrotted material is brought to the middle of the heap.

After a further period the heap should be uniform in colour, dark brown, and all material completely broken down. A second or third turning may be required to complete the process before the heap is ready to use as a manure.

Value.

A well made compost derived from good gardening waste may be quite as good for the garden as farmyard manure, for it adds humus as well as some nitrogen, phosphate and potash, and thus forms a fairly complete manure to replace the more active manure like blood and bone which is not available.

Compost is a valuable manure for all types of crops and if there is not much of it, just fork it into the top 3 or 4 inches of soil, as this makes a good tilth and promotes better germination and quicker growth in the earlier stages. If there is plenty of compost, then it should be dug in, in the usual way, while any excess can always be used as a top dressing and mulch.

Do not add paper, coal cinders, wood, oil, creosote or similar material to the heap or you will destroy its value.

Straw.

Rice growers usually have surplus straw which is burnt instead of being turned into good manure or compost.

To treat rice straw, spread a layer 12 inches deep over a 5 feet square and soak with water or liquid manure. Cover with a layer of animal manure, bird or bat guano, about 3 inches thick, then add another layer of straw, wet it thoroughly and then add another layer of manure. Repeat this process until the heap is about 5 feet high, finishing the top off with a good layer of wet straw.

In two or three weeks, the heap will sink to 3 or 4 feet and should then be turned by digging out the middle and turning in the sides. Do this again a month later, making sure that the heap does not dry out by watering occasionally during the first few weeks.

The straw compost should be ready for use in three or four months so that if done immediately after harvesting and threshing, it would be ready to plough in to manure the next crop. A good sprinkling of coral sand on the straw when making the heap will improve the quality of the compost.

ENTOMOLOGICAL NOTES.

1. FOOD PREFERENCES OF SOME BEETLES FOR STORED PRODUCTS.

By R. J. A. W. LEVER, B.Sc. (Hons.), D.I.C., A.I.C.T.A., F.L.S.,
Entomologist.

DURING July, 1944, some 300 tons of stored rice were fumigated firstly with carbon bisulphide and secondly, with more success, with sulphur dioxide provided and generated by the Health Office. The most abundant beetles were *Calandra oryzæ* L., *Tribolium castaneum* (Hbst.) and *Alphitobius lævigatus* F. All recent work on stored product pests shows that the last mentioned, popularly called the black fungus beetle, rarely or ever damages grain that is sound and dry but is only attracted to grain which is spoilt or out of condition through damp or mould (1). This was found to be the case as the rice had been stored for an unusually long period and minimum storage was accordingly recommended though this is often difficult under war-time conditions.

On a third occasion *Alphitobius* was controlled, this time spraying 2 fluid ounces of diesel oil in 3 gallons of water to which had been added ¼ lb. lead arsenate. This solution was directed on to concrete walls, where the beetles were congregating in large numbers, and gave a satisfactory kill.

A Chinese storekeeper complained that his stock of Australian-made anti-mosquito spirals was unsaleable on account of insect injury. Examination showed the culprit to be the cigarette beetle *Lasioderma serricorne* (F.) recorded in 1943 as a pest of dehydrated cabbages and bean pods (2). Selection for food of a substance containing, according to the manufacturers, both pyrethrum and tobacco dust, is interesting though not a unique record.

Last August a set of mah jong counters made of bamboo and ivory in apposition was found to have the wooden part bored by beetle larvæ. No adults could be obtained but Dr. F. van Emden of the Imperial Institute of Entomology was able to identify specimens of the grubs as *Cataroma herbarium* Gorh., the local book borer, which is also a pest of leather suit cases and photograph frames, etc. This was of particular interest as the same unusual objects were shown (3) to be attacked by the drug store beetle *Sitodrepa panicum* (L.) in the United States.

The well known copra bug or ham beetle, *Necrobia rufipes* de Geer and *N. ruficollis* F. were found breeding in drying bodies of cattle in the Sigatoka and Nadi districts. As a matter of interest they were taken in a dry sheep's carcass near Nelson, New Zealand, in late October, 1944, the last day of which had 4.6 degrees of frost (4). This shows an enormous toleration of temperatures by the beetle as the mean of mean maximum and minimum temperatures in Suva averages 77.5 degrees F. So far as can be ascertained this record (August, 1944) of *N. ruficollis* is a new one for the Colony.

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(3) Linsley, E. G. 1942. *Journal Econ. Entom.* Vol. 35, No. 3, June, p. 452.
(4) *Evening Mail,* Nelson (N.Z.) 1st November 1944.

2. THE LARGER CABBAGE MOTH, *CROCIDOLOMIA BINOTALIS* ZELL.

DURING the last few years damage to cabbages by the green, web-spinning larvæ of *Crocidolomia binotalis* Zell. has become more obvious with the increased areas of land under vegetable gardens. The popular name of the larger cabbage moth has been adopted from South Africa where this insect also occurs in association with the much smaller diamond-back moth.

Overseas Distribution.

This is essentially an Asiatic insect ranging from the Philippines through Malaysia to India and occurring also in the Seychelles and Mauritius. Although recorded in Zanzibar in 1913 it did not become a pest in South Africa till the early 'twenties but it has been a pest in the Belgian Congo since 1935.

It was recorded in Queensland as early as 1914 as a cabbage pest in that State where it is called the cluster grub. Of more local interest is its presence in Tonga (an obvious introduction) and in New Caledonia ([1]) but its significant absence from Samoa as late as 1941 ([2]) is suggestive of its late arrival in the Pacific Islands which certainly suit it biologically.

Local Distribution.

So far as the writer can discover *Crocidolomia* was not recorded from Fiji until 1938 ([3]) although he took it in three islands in 1937 and bred it from material forwarded from the island of Naitamba in 1938 showing that this insect must have been present for several years prior to 1937. The date of its arrival in the Colony will probably never be more accurately known.

All annual reports since 1941 list it as a pest of crucifers on which it is generally distributed.

Host Plants.

The usual plants affected are English and Chinese cabbages, radish and Indian mustard besides the ornamental *Clerodendron fragrans* R. Br. *pleniflorum* Schan. (kindly identified by Mr. W. Greenwood of Lautoka). Damage to the more compact English cabbage (*Brassica oleracea* L.) is usually more severe than to the Chinese cabbage (*B. chinensis* L.) and it is noticed that the more open-leaved variety ' pak choy ' suffers less than the closer formed ' wong gah pak ' which is therefore less grown. Damage to Indian mustard (*B. juncea* Cosson) and Chinese radish (*B. sativus hortensis* Backer)—locally referred to as " turnip "—is usually not severe.

Description and Life History.

The yellowish-green eggs are laid on the lower surface of the leaves and their overlapping arrangement suggests fish scales forming a blister-like cluster. No covering of hairs from the female's body has been noticed here as recorded in Queensland ([1]). The eggs hatch in four days giving rise to green larvæ with four thin white longitudinal lines and black dots ; when mature the larvæ measure three-quarters of an inch in length. At first the young larvæ are gregarious but later scatter to spin fairly thick webs on the lower surface of the leaves and in the heart of the cabbage. Pupation follows in 10 to 11 days and has always been found to take place underground in an earthen cell thereby differing from observations in Mauritius where " pupation sometimes occurs on the leaf " ([5]). The moth emerges in from 9 to 11 days, i.e. 23 to 26 days from oviposition according to whether it is the cool

season (July, 73.2 degrees F.) or hot one (January, 79.3 degrees) ; these being mean monthly temperatures in 1944-45. The adult larger cabbage moth has a wing-span of an inch with variegated brown markings on a cream-coloured background. The specific name of *binotalis* was given in allusion to the two white spots ringed with dark brown which occur on each forewing. In the male sex a strong tuft or brush of curled backwardly directed hairs is found on the front margin of the forewing. Pores from scent glands open within this organ, which is absent in female moths, and is said to have an aphrodisiac effect.

Acknowledgment is made to Jona Uluinaceva who did most of the work on the life histories.

Parasites.

Only two parasites have been reared from the caterpillars—neither being of any appreciable control value : they are unnamed species of *Apanteles* and *Chelonus*, not *Cholonella* as recorded previously (6).

Artificial Control.

Early in 1944 there was a shortage of Black Leaf 40 so it became necessary to sell lead arsenate to the market gardeners which is to be avoided if possible for a crop with edible leaves. In 1942 pamphlets printed in Chinese had stressed the importance of using the accepted strength of Black Leaf 40 (one teaspoonful per gallon of water) as experience had shown that amounts up to half a pint of the nicotine had been used to the gallon and even arsenicals added ! When stocks became available the Black Leaf 40 was used exclusively. In August, 1944, the first shipment of cryolite for civilian use arrived and when used at the rate of 2 ounces in 3 gallons proved satisfactory against both the larger cabbage moth and the associated diamond back moth.

Destruction of old plants and leaves as well as weeding between the rows is often not done as thoroughly as it should. Manuring with blood and bone, on the other hand, is usually well carried out though further supplies are unlikely.

REFERENCES.

(1) Williams, F. X. 1944. *Hawaiian Sugar Planters' Record*, Vol. 48, No. 2, p. 113.
(2) Swezey, O. H. 1941. *Ibid.* Vol. 45, No. 1, pp. 25-38.
(3) Lever, R. J. A. W. 1939. Annual Bull. Divsl. Rpts. Fiji, p. 33.
(4) Smith, J. H. 1943. *Queensland Agric. Jnl.* Vol. 57, No. 4, October, p. 222.
(5) Moutia, A. 1935. Bull. No. 44, Dept. of Agriculture, Mauritius.
(6) Lever, R. J. A. W. 1944. *Agl. Jnl.* Fiji. Vol. 15, No. 3, Sept., p. 74.

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3. FRUIT FLY PARASITES AND HOST PLANTS.

In dealing with the parasites of the common fruit fly *Chaetodacus passiflorae* Frogg. mention was made (1) of a second Braconid. This shoud be a Pteromalid, *Pachyneuron* sp., as the only Braconid taken in December, 1943, was *Opius tryoni* cam.

In the *Journal* for last September (2) the names *Pometia* and *Spondias* were transposed, the host plant was the ' dawa ' *Pometia pinnato* Forst.

A new record for this fly is cocoa pods collected in Vanua Levu by the Agricultural Officer, Northern.

REFERENCES.

(1) Lever, R. J. A. W.—1944. *Agric. Journal*, Fiji, Vol. 15, No. 3, March, p. 15.
(2) Ditto—1944. *Ibid.* 15, 3, Sept. p. 78.

4. THE PREDACEOUS PLANT BUG *CYRTORHINUS* IN FIJI.

In a paper dealing with the distribution of Pacific island species of *Cyrtorhinus* Usinger lists (1) only one species *C. mundululus* Breddin—from Fiji. However, all but one species of these plant bugs sent by the writer to the Imperial Institute of Entomology, London, have been determined by Mr. G. E. Bryant as *C. fulvus* Knight ; further, all specimens in the Departmental collection run down by Usinger's own key to this species. The only exception was *C. riveti* Cheerman, which is not listed in Usinger's paper as present in Fiji, but was taken in the Rewa delta. From his table of distribution it is clear that *fulvus* is an Asiatic (Philippines and Java) and Polynesian (Samoa, Fiji and Hawaii) species ; *mundulus* is Austro-Malayan (Australia, Philippines and Java) and *riveti* is Polynesian (Tahiti and Samoa) and Micronesian (Guam) so that it is more logical to expect *fulvus* than the Asiatic *mundulus* to be the abundant species in Fiji, despite Timberlake (2) who says *mundulus* is common there as in Queensland.

Brief references to the habits of *fulvus* are given in an earlier paper by the writer (3) who has observed this plant bug feeding on the eggs of the leafhopper, *Megamelus proserpina* Kirk., buried in the leaf-stalk of taro or dalo (*Colocasia esculenta* Schott).

REFERENCES.

(1) Usinger, R. L.—1939. *Proc. Haw. Ent. Soc.* X, 2. December, p. 273.
(2) Timberlake, P. H.—1929. *Ibid.* VI, 3, October, p. 538.
(3) Lever, R. J. A. W.—1940. *Agric. Journ.* Fiji, Vol. 11, No. 2, June, p. 42.

SUVA RAINFALL, 1944.

The rainfall recorded at Suva during 1944 was 112.52 inches made up as follows :—

	1944.	*Monthly average for 57 years.*
January	13.80	11.03
February	15.02	11.13
March	22.72	14.73
April	12.72	12.90
May	4.33	10.67
June	5.32	6.33
July	2.97	5.41
August	5.01	8.14
September	14.55	7.87
October	3.64	8.96
November	2.40	10.24
December	10.04	12.79
Annual Total	112.52	120.20

This is therefore 7.68 inches below the 57 year average of 120.20. The annual average for 60 years works out at only 103.74 inches, both 1942 and 1943 being exceptionally dry with respectively 93.83 and 88.44 inches of rain.

—R.J.A.W.L.

VETERINARY NOTES.

1. RINGWORM IN HORSES.

By H. T. B. HALL, B.V.Sc.,
Acting Senior Veterinary Officer.

THE recent outbreak of ringworm in horses over the whole of Viti Levu has caused some concern to horse owners. The following notes will help those interested to deal with the condition.

The name of the fungus causing this condition is *Microsporon equinum* and it is distantly related to ringworm in humans. The disease usually takes the form of rounded patches which appear on the upper parts of the body. There the hair appears to have been closely clipped, the skin being covered with short stumps of hairs which are enveloped in a whitish deposit. The free ends are frayed out and the intervening skin is covered with scales of varying thicknesses which may be fused together into crusts. Considerable desquamation takes place, similar to the scales of dandruff. The more or less rounded patches are greatly enlarged, become confluent, and finally large areas of skin may be affected. The sites earliest affected are the withers and rump. Sometimes the poll becomes affected first together with the ears. Areas may finally include the whole of the back, rump, neck and head and may then spread down the sides to the legs. Rarely the underside of the body and the legs become affected. Itching is one of the prominent symptoms of the condition and in this regard differs somewhat from the disease seen in other parts of the world where itching is usually absent or slight. The animal rubs itself against trees, fence posts, etc., and as the skin becomes broken, hæmorrhaged patches are seen which may cause ulcerous sores in which infection by micro-organisms leads to suppuration.

Recent observations in the western districts have indicated that the disease is spreading even to wild horses. It has been present for about five or six months and in the last month or so has appeared in the eastern districts where it has spread rapidly.

The causal organism has been known in this country for some years and probably owing to the climatic conditions prevailing at present, its virulence has greatly increased. Consequently instead of a few sporadic cases being seen annually, more than half the horses in whole districts are affected.

Treatment.—Application of Mycozol or Cozsal to the affected areas at least once daily usually clears it up. Where hard crusted areas are found sulphur ointment may be applied with good effect. If the hair is long it should be clipped as close as possible. Hard crusts should be softened by applying a mixture of soft soap and lard (equal parts). The softened crusts are then scraped or washed away. The fungus is susceptible to sunlight and fresh air, and consequently animals which are normally stabled should be allowed out in the paddock. Care should be taken to see that unaffected animals do not come in contact with affected. Where a Veterinary Officer or Stock Inspector is available application should be made to him for further advice and treatment.

Other applications which have recently proved effective are 10 per cent Stockholm tar in coconut oil, and 10 per cent Dieselene in coconut oil.

It is best if the horses are not ridden or worked at all but where an animal has only a few patches which are well away from the places where harness comes in contact with the skin and no serious break in the skin is seen, light work should not affect it seriously.

The above drugs are obtainable from chemists or from Veterinary Officers or Stock Inspectors.

Reprinted from *Fiji Times & Herald*, November 1944.

2. THE PREPARATION OF " RIEMS " OR HIDE ROPES.

By
H. T. B. Hall, B.Sc., Acting Senior Veterinary Officer
and RARIKUA S. VERA, Officer in Charge, Nasinu Farm.

In the September issue of the *Agricultural Journal* a short article appeared on a method of making rope from hide. Further experimental work at Nasinu Farm has now been done and very suitable riems have been made from the hides following the method outlined, except that at Nasinu instead of de-hairing the hides by the methods described this was carried out by soaking in lime water. A mixture of 10 lbs. of lime in 15 gallons was made and the hides soaked in it for 10 days. The hair was then scraped off by laying the hides flat and scraping with pieces of box-wood, using the sawn side of the wood. It was found that knives could not be used as they damaged the hides. The hides were then drained by throwing over a rail for a few hours and afterwards laid outside down on concrete, thoroughly salted and left for one week. Subsequently they were cut in riems, hung over a branch of a tall tree, treated with coconut oil and tallow and beeswax and after stretching and twisting put to use. The reims thus produced have proved very satisfactory as leg ropes, tail ropes and tethering ropes, as well as for numerous other purposes on the farm. The mixture used in preserving the riem was made up as follows :—

1 lb. tallow ; ¼ lb. beeswax ; ½ gallon coconut oil.

Three dressings with this mixture were made over a period of two weeks.

The Officer in Charge at Nasinu Farm will show the uses to which this riem can be put to any farmers who wish to visit Nasinu Farm. A further length of riems is at present at the Veterinary Division Laboratory at Suva and can be examined there.

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3. NOTES ON DAIRY PRODUCTION IN TAILEVU DURING 1944.

By
JOHN J. C. SUCKLING, Dip. Dairying (Massey College),
Agricultural Assistant.

The year was not a good one from the point of view of production. The early months were extremely wet, and this was followed by a long dry spell almost unknown in its duration in Tailevu. Labour difficulties were again met with, though this eased up towards the end of the year. Lack of casual labour prohibited what would certainly have been a wide-spread pasture improvement programme.

When the military camps in the district moved, dairymen who had taken advantage of camp swill for pig raising were obliged to reduce the numbers in their fattening pens as concentrates have been difficult to obtain. More success has been met with in the rearing of calves. Excellent results attended early drenching and wider ranging, especially where the calf pens have been moved to elevated areas. Poultry raising as a sideline was limited owing to the greatly increased price of maize and padi, supplies of which were very short.

The legislation controlling the slaughter of young stock has increased the size of almost every herd, and at the close of the year many dairymen had young stock for sale.

In an endeavour to form some picture of the district's production, the following table has been prepared from figures supplied by the dairymen themselves. They are representative of the area, and in the absence of individual cow testing, show what can be expected from the type of cattle under the conditions operating in Tailevu. Farm 1 is on undulating country and the remaining five are on the more representative flat areas of the Waimaro and Wainivesi rivers.

Column.

(*a*) gives the total area of the farm in acres.
(*b*) lists the effective cleared acreage on which dairying is undertaken.
(*c*) shows the total number of dairy cattle over weaning age.
(*d*) indicates the average number of cows in milk throughout the year. In this respect it is generally accepted that a cow stays in milk in Tailevu for seven months. As the figure given is for the average number of cows in milk throughout the whole year, and production is continuous, the yield per cow will be taken as seven-twelfths of the total butterfat production of the farm divided by the average number of cows in milk at any time. This figure remains fairly constant on most farms.
(*e*) gives the butter factory returns for the year.
(*f*) is an estimation of the additional butterfat calculated as having been used on the farm for calf rearing, home consumption during the year.
(*g*) shows the sum of the figures under (*e*) and (*f*).
(*h*) lists the calculated yield per acre.
(*i*) indicates the yield per acre.

	Acres		*Cows*		*Pounds*				
Farm	(*a*)	(*b*)	(*c*)	(*d*)	(*e*)	(*f*)	(*g*)	(*h*)	(*i*)
1.	490	100	90	32	3,844	1,300	5,144	94	51
2.	372	250	160	65	10,400	1,800	12,200	110	49
3.	355	190	178	52	11,000	1,460	12,460	139	66
4.	568	200	110	40	6,500	800	7,300	106	36
5.	525	400	240	90	12,000	2,000	14,000	90	35
6.	779	300	220	72	7,200	1,500	8,700	70	29
Avrge.	505	240	166	58	8,490	1,477	9,967	106	44

Of interest is the fact that no attempt is made to control calving dates to coincide with " flush " periods of grass growth. This appears bad practice, but experiences of those who have attempted to do this have resulted in very delayed calving, or the cow when turned into the bull will fail to " take " altogether. It appears that in Tailevu the period of best fertility is in the first or second "season " after calving, so that it is common practice to run the bull with the herd.

The figures above indicate the need for greater production per cow and per acre ; the former will be increased as soon as importation of higher producing animals is permitted, but even with this the need for improvement in pastures must be faced or high potential producers will remain only potentials.

TWO NEWLY DECLARED NOXIOUS WEEDS.

By Proclamation No. 2 of 1945 published in the *Royal Gazette* (No. 5 of 26 January, 1945, page 21) the following plants have been declared to be noxious weeds in the Colony of Fiji :—

1. *Mimosa invisa.*
2. *Opuntia* (Prickly Pear).

As this proclamation under the Noxious Weeds and Diseases of Plants Ordinance makes landholders in any part of the Colony liable to prosecution for failure to eradicate these weeds from their land the following brief descriptions are provided :—

1. *Mimosa invisa* Mart. (Fam. Leguminosæ). Giant Sensitive Plant.

Botanical description.—A far spreading shrub with scandent stems up to six feet in length. Stems pale green about 3 mm. in diameter, closely armed with rows of recurved spines. Leaves bipinnate, moderately sensitive to touch ; leaflets small, in numerous pairs, 4-5 mm. long ; petiole 5-6 cm. long.

Flowers borne in globular heads about 1 cm. diameter, peduncle short, 1 cm. long. Calyx minute, corolla about 2 mm. long, stamens twice as many as petals. Fruit, short twisted pod, 1.5 to 2.5 cm. long, clothed with patches of small spines which aid distribution. Seeds 3-4, small.

The plant may be distinguished from ordinary sensitive plant by its large size and long, ascending angular stems, and by the bi-pinnate leaves, small leaflets and by the much small flower heads. The foliage is of a pale green colour and the leaves less sensitive to the touch.

Origin.—Corbett (1) records that this American species was formerly employed as a cover crop of rubber in Malaysia but has a decided disadvantage in the fact that it harbours various species of insects.

Seeds of this plant would appear to have been accidentally introduced to Fiji in consignments of seeds of *Centrosema pubescens* and *Calopagonium muconoides* from that region.

Distribution.—The plant has so far been recorded at Sigatoka (1940) and Tailevu (1937), in Viti Levu (2). In both localities it does not appear to have spread widely ; but it is recorded as probably one of the worst potential weeds to have yet reached Fiji.

Status as Weed.—The plant is of robust growth, scrambling by means of the spiny stems over herbage, and forming close clumps or thickets several feet high. It flowers profusely and produces enormous numbers of small spiny pods which are admirably situated for distribution in the fur of animals, in clothing or by other similar means. There are three to four seeds in each pod and germination is rapid. Locally plants have been observed heavily infested with scale insects.

Up to the present this plant has been reported from the following localities in Viti Levu—Sigatoka, Nadi, Tavua and Korovou, Tailevu. It has proved very persistent in its growth and difficult to eradicate.

2. *Opuntia* is a genus of 200 species belonging to the Cactus family (*Cactaceæ*)—These are succulent-stemmed shrubby plants usually with small cylindrical fleshy leaves which either fall off early or are represented by tufts of spines. The fleshy stems are usually jointed, the joints mostly compressed, and bear fascicles of prickles or bristles. For this reason certain species are called " prickly pears." The flowers are yellow and the fruit purplish-red, pulpy inside, nearly smooth outside.

The plants may be propagated vegetatively by the separation of branches and in dry climates spread may be rapid. Some species have become troublesome weeds in Australia.

Local distribution : The material on which the recent proclamation is based was collected by R. J. Lever, Esq., Entomologist, near the Signal Station ("Flagstaff") in December, 1944, from sterile plants growing in a garden. There are no records of plants of this genus having become naturalized anywhere in Fiji but specimens of several members of the family are occasionally met with in cultivation or as pot plants. —B.E.V.P.

REFERENCES.

(1) Corbett, A. S.—1935, "Biological Processes in Tropical Soils."

(2) Parham, B. E.—1942, "Observations on Plants received for identifications"—*Agric. Journ.* Fiji, Vol. 13, No. 2, p. 50.

AGRICULTURAL RESEARCH IN THE UNITED STATES.

The Beltsville Centre has approximately 2,200 employees. Its scientists include animal husbandmen, bacteriologists, bio-chemists, biologists, botanists, apicultirists, pathologists, veterinarians, chemists, entomologists, geneticists, horticulturists, and zoologists. Nearly 3,000 animals and 10,000 fowl are kept for experimental purposes. Each of the 36 laboratory buildings is equipped for a special kind of research. Thirty-one greenhouses have been built for experiments with plants and insects. About 100 barns and 500 storage buildings and other structures shelter the animals and fowl.

When Florida's tomato-shipping industry was about to be virtually extinguished by the ravages of two diseases, Beltsville scientists developed new wilt-resistant and spot-resistant tomatoes just in time, and the industry was saved.

Beltsville chemists were the first to determine the correct chemical structure of rotenone, a valuable insecticide dust which, though highly toxic to cabbage worms and other pests, is harmless to human beings. Rotenone is the chief insecticidal constituent of derris, the roots of which Chinese market gardeners in the Malay Peninsula have used to kill insects attacking their crops. It is also found in a South American plant, cube.

Insecticides to aid the soldier as well as the farmer have been developed at Beltsville. Among them is the so-called aerosol bomb, which the U.S. Army has found amazingly effective for combating disease-carrying mosquitoes, flies, and other insects in barracks, hospitals, kitchens, tents and foxholes. The small containers of aerosol release a smoke fog which does not affect man. The material is in common use in fumigating airplanes to prevent the spread of disease-carrying insects.

Another Department of Agriculture development which has vast postwar possibilities as a fly-killer is the spray known as DDT. The secret of the new insecticide is that when sprayed on walls and ceilings it leaves an invisible deposit of a substance highly toxic to flies. At the Department of Agriculture's Entomology and Plant Quarantine Laboratory at Orlando, Florida, flies confined in cages that had been treated with the spray 150 days previously died within an hour. In a dairy barn sprayed once with DDT, the fly population was reduced 95 per cent for four months.

—Elliot Merrick in "*U.S.A*", Vol. 2, No. 3, N.P.

PLANT DISTRIBUTION LIST.

THE following is a list of economic and ornamental plants now available at the Central Agricultural Station, Naduruloulou.

Seedling trees are supplied in bamboo pots and shrubs, etc., are well-rooted plants suitable for planting out at once.

For hedges, etc. cuttings are available, the price being 10/- per 100.

Orders may be made direct to Agricultural Officer Southern, Naduruloulou or to the Head Office of the Deparment of Agriculture, Suva.

Purchasers must make their own arrangements for transport and freight from Naduruloulou to destination.

I—TREES. ORNAMENTAL AND TIMBER—SUITABLE FOR SHELTER BELTS, ETC., ON FARMS, 1*s.* each.

Botanical Name.	*Common Name.*	*Remarks.*
Adenanthera pavonica	Red bead tree	Fine leaves, red seeds
Albizzia lebbek	Rain tree	Flowers cream.
A. falcata	White rain tree.	
A. procera	Silver rain tree.	
A. saponaria	————	Large leaves.
Bischoffia javanica	Koka (Fiji).	
Calophyllum inophyllum	Dilo (Fiji)	White flowers.
Canangium odoratum	Makosoi (Fiji)	Yellow flowers.
Cassia fistula	Indian laburnum	Yellow flowers.
C. grandis	Horse Cassia	Pink flowers.
C. siamea	————	Pale yellow flowers.
Casuarina equisetifolia	Nokonoko (Fiji)	Foliage and timber tree.
Citharexylum spinosum	Fiddlewood	White flowers.
Cresentia cujute	Grind tree.	
Delonix regia	Flamboyant	Red flowers.
Elaeocarpus grandis	Bead tree	Red leaves in season.
Endospermum macrophyllum	Kauvula (Fiji)	Timber.
Eugenia malaccensis	Kavika (Fiji) Malay apple.	Fruit.
Ficus benjamini	Weeping fig	Shade tree.
F. religiosa	Indian fig	Shade tree.
Filicium decipiens	Fern-leaf tree	Timber and shade.
Gliricidia sepia	Madre-de-cacao	Windbreak and shade.
Gmelina arborea	Yemane	Timber and shade.
Hevea brasiliensis	Rubber	Latex.
Hydnocarpus wightianus	Chaulmoogra.	
Intsia bijuga	Vesi	Timber and shade.
Jacaranda mimosaefolia	Jacaranda	Ornamental flowers.
Lagerstroemia flos-regina	Pride of India	Quick growing mauve flowers.
Melia azedarach	Persian lilac	Profuse lilac blossom.
Ochroma lagopus	Balsa	Light wood, fibre like kapok.

Botanical Name.	*Common Name.*	*Remarks.*
Pithecellobium saman	Large rain tree	Shade tree.
Pometia pinnata	———	Edible fruit and timber.
Pongamia glabra	Indian walnut	Shade and timber.
Premna taitensis	———	Fence posts, firewood.
Pterocarpus indicus	———	Timber and shade.
Salix babylonica	Weeping willow	Shade tree.
Securinega samoana	———	Durable timber.
Spathodea campanulata	African tulip	Ornamental quick-growing.
Spondias dulcis	———	Fruit, autumn foliage.
Swietenia macrophylla	Mahogany	Timber, quick-growing.
S. mahogani	Mahogany	Timber, small leaf.
Tamarindus indica	Tamarind	Preserves (fruit), timber.
Tectona grandis	Teak	Timber and windbreak.
Terminalia chebula	Indian almond	Timber: tanning (fruit).

II—Economic. Shrubs and Trees—Fruits, Oils, etc., 1s. each.

Aleurites montana	Tung oil	White flowers, nuts contain oil.
Anacardium occidentale	Cashew-nut	Edible nut.
Annona muricata	Sour-sop	Edible fruits.
Areca catechu	Betel-nut	Edible nuts.
Artocarpus incisus	Breadfuit	Edible fruit.
A. rigidus	Breadnut	Edible fruit.
Averrhoa bilimbi	Bilimbi	Preserves.
A. carambola	Carambola	Preserves.
Bixa orellana	Annatto	Dye and hedges.
Calophyllum inophyllum	Dilo	Oil. Flowers white.
Camellia thea	Tea	Flowers white & yellow.
Canarium commune	Java almond	Edible nut.
Ceiba pentandra	Kapok	Fibre, "P.W.D. Tree."
Cinnamomum zeylanica	Cinnamon	Spice.
Citrus aurantifolia	Lime	Fruits, foliage & flowers.
C. aurantium	Seville orange	Preserve.
C. limonia	Lemon	Lisbon and red.
C. maxima	Shaddock	Preserve.
C. medica	Citron	Preserve.
C. nobilis	Mandarin.	
C. paradisi	Grapefruit	2 vars. March, Seedless, Duncan.
C. sinensis	Oranges	3 vars. Jaffa, Valencia and Lui Gim Gong.
Cocos nucifera	Coconuts	Dwarf hybrid seedlings.
Coffea arabica	Arabian coffee	...
Cynometra cauliflora	———	Fruit borne on trunk.
Derris (*Deguelia*)	———	Insecticide: flowers like *Wistaria*.

Botanical name.	*Common name.*	*Remarks.*
Eugenia cumini	———	Edible fruit.
E. brasiliensis	———	Edible fruit.
E. jambos	Rose apple	Edible fruit.
E. malaccensis	Malay apple	Edible fruit.
E. uniflora	Surinam cherry	Edible fruit, red berries.
Hevea brasiliensis	Rubber	Latex.
Hydnocarpus wightianus	Chaulmoogra	Oil medicinal.
Macadamia ternifolia	Queensland nut	Edible nut.
Moringa oleifera	———	Edible oil and leaves.
Musa cavendishii	Banana	Fruit.
M. sapientum	Plantain	Fruit.
Passiflora edulis	Passion fruit	Fruit.
P. laruifolia	Bell apple	Fruit.
P. quadrangularis	Granadilla	Fruit.
Persea americana	Avocado pear	Fruit.
Pimenta officinalis	Allspice	Spice.
Sesbania grandiflora	———	Edible flowers.
Spondias dulcis	Polynesian plum	Fruit.
Theobroma cacao	Cocoa	Beverage.
Vanilla planifolia	Vanilla	Spice (" Pods ").
Zingiber officinalis	Ginger	Spice (" Roots ")

III—Shrubs. Ornamental foliage: 9d. each and 6s. per doz.

Acalypha wilkesiana	Fiji fire bush or Jacob's coat	Multi coloured leaves.
A. torta	Acalyphya	Bronze foliage.
A. marginata	———	Bronze leaves, pink margins.
Aralia (*Polyscias*) *guilfoylei*	Danidani	4 vars. variegated foliage.
Breynia nivosa	———	White foliage.
var. *rosea picta*	———	White and pink.
Codiaeum variegatum—		
var. *pictum*	Crotons	Vars. Large leaves.
var. *moluccanum*	Crotons	Vars. Medium.
var. *genuinum*	Crotons	Red, white, bronze leaves 8 varieties.
Eranthemum spp.	———	White, yellow, bronze or pink variegated leaves.
Erythrina	———	Variegated leaves.
Euphorbia neriifolia	———	Red or green foliage.
Leonotis nepetaefolia	———	Yellow and green.
Ligustrum japonicum	Privet	Cuttings useful for hedges.
Morinda citrifolia.		
Pandanus	Screw pine	White variegated leaves.
Pennisetum Rupelli	Bronze reed grass	Bronze foliage.
Russelia juncea	———	Fine leaves, red flowers

IV—Shrubs. Flowering, 1s. each.

Botanical Name.	*Common Name.*	*Remarks.*
Allamanda cathartica	Allamanda	Flowers, large yellow.
A. schotti	Allamanda	Flowers, small yellow.
A. schotti var.	Allamanda	Flowers, medium yellow.
A. violacea	Purple Allamanda	Flowers, mauve.
Ardisia crenata	Australian holly	Red berries.
Bauhinia candida	White butterfly	Flowers, white.
B. monandra	Butterfly tree	Flowers, mauve.
B.	Butterfly tree	Flowers, cream.
Bixa orellana	Annatto	Pink flowers.
Brassaia actinophylla	Queensland umbrella tree	Red flowers.
Brownea grandiceps	Rose of Venezuela	Orange-red flowers.
Caesapinia coriaria	Sappan-wood	Yellow flowers.
C. pulcherrima	Pride of Barbados	Yellow or red.
Cassia floribunda	Yellow Cassia	Yellow.
Cestrum nocturnum	Queen of the night	Cream.
Clerodendron nutans	Clerodendron	White.
C. serratum	Clerodendron	Blue.
C. thompsoni var. (*a*)	Clerodendron	Red and white.
var. (*b*)	Clerodendron	Red and pink.
C. fallax	Clerodendron	Coral red.
C. fragrans	Clerodendron	White perfumed.
Duranta repens	Pigeon berry	White and blue.
Erythrina indica	————	Red.
Evodia hortensis	Uci (Fiji)	Cream, perfumed.
Franciscea bicolor	Franciscea	White and mauve.
Gardenia florida	Gardenia	White perfumed.
Gliricidia sepia	Madre de Cacao	Pink.
Grevillea robusta	Silky Oak	Cream and red.
Herpetica alata	Candelabra Bush	Yellow.
Hibiscus rosa-sinensis	Hibiscus var.	Red, yellow, etc.
H. schizopetalus	Coral hibiscus	Red.
H. mutabilis	Chinese rose	Pink or white.
H. syriacus	————	Mauve or white.
Holmskioldia sanguinea	Parasol flower	Red.
Ixora spp.	Ixora	Vars., red, pink.
Jacobinia	Jacobinia	Yellow.
Lagerstroemia indica	Crepe myrtle	Pink or mauve.
Lasiandra	Lasiandra	Mauve.
Lawsonia alba	Mignonette bush	Cream flowers perfumed.
Montanoa	Tree daisy	Cream flowers.
Nandina domestica	————	Small white flowers.
Nerium odorum	Oleander	Pink or white flowers.
Pentas carnea	Pentas	Pink, mauve or white flowers.
Plumbago spp.	————	Pink, blue or white flowers.

Botanical Name.	*Common Name.*	*Remarks.*
Plumeria acutifolia ..	.. Frangipani ..	.. White flowers, perfumed.
P. rubra	.. Frangipani ..	.. Pink flowers, perfumed.
Punica granatum ..	.. Pomegranate	.. Red flowers, perfumed.
Rivina atro-purpuriens	.. Ronge plant	.. Red berries.
Stenolobium stans ..	.. Yellow elder	.. Yellow flowers.
Tabernaemontana coronaria	———	White flowers, perfumed.
Thevetia neriifolia ..	.. Yellow Oleander	.. Yellow flowers.
Thunbergia erecta (*a*) ..	———	Purple flowers.
Thunbergia erecta (*b*) ..	———	White flowers.

V—Shrubs. Climbing—Ornamental, 1s. each.

Allamanda carthartica ..	.. Allamanda ..	.. Large yellow.
Antigonon leptopus ..	.. Corallita ..	.. Pink.
Beaumontia grandiflora ..	———	White.
Bignonia	———	Magenta.
Bougainvillea spectabilis (*a*)	———	Mauve.
Bougainvillea spectabilis (*b*)	———	Red.
Clitorea ternatea ..	.. Butterfly pea	.. Blue.
Ficus pumila ..	.. Creeping fig	.. Close-clinging, small leaves.
Jasminum sp. ..	.. Jasmine ..	.. White, perfumed.
Lonicera sp.	.. Honeysuckle	.. Cream and white, perfumed.
Petrea volubilis (*a*) ..	.. Petrea ..	.. Violet.
Pyrostegia sp. ..	.. Firecracker vine	.. Orange.
Solandra sp.	.. Cup of gold	.. Golden yellow.
Solanum wendlandiana	.. Potato vine	.. Mauve.

U.S. PYRETHRUM ALLOTMENTS.

Because United Nations military forces in Italy and the Pacific need most of the supply of pyrethrum to protect them from malaria-bearing mosquitoes, War Food Administration officials say farmers and gardeners will have only about one-twelfth as much pyrethrum for crop use this year as last.

The pyrethrum left after military needs are taken care of is reserved for pests which cannot be controlled with other materials.

Officials of the U.S. Department of Agriculture will allot some of the pyrethrum to control insects in food processing plants where it is not safe to use insecticides, which are known to be harmful to human beings. Some will go to control leaf hoppers on raisin grapes dried for the armed forces—and to control beetles on ripening fruits such as peaches, nectarines and apricots. Some of the pyrethrum will be used to control plant bugs on sugar beets and other seed crops. For those and certain other uses there are no satisfactory substitutes for pyrethrum. Even the growers of those crops may not get more than a fourth as much pyrethrum as they need, but they will get first call.

On some crops, growers can use rotenone in place of pyrethrum—or they can use nicotine. Or they may substitute cryolite which is not nearly as harmful to human beings as the arsenicals.

A REVIEW.

"THE COCOA SITUATION IN THE EMPIRE."

In the *Crown Colonist* of September, 1944, Mr. Henry J. M. McFall draws attention to a probable world shortage of cocoa beans when, but a year ago, solutions were being sought for problems of surpluses.

Cacao is the "cash crop" of the Gold Coast and is an important crop in Nigeria. West Africa has brought supply down to a question of bulk and quantity and appears to have lessened the importance of flavour and quality which are characteristics of the West Indian and Ceylon cocoa. Will the application of chemistry to the poor quality of the West African crop enable this cocoa to be adopted to any whim of public taste resulting in the extinction of the fine quality producing areas? There is no difficulty at present in finding a ready market for all West Indian cocoa. The Ceylon crop is being sent to the Middle East territories at present and it is hoped this market will remain permanent. With the possibility of a vastly increased world demand it is thought that the fine quality producing areas will survive.

The falling off in production is mainly due to low prices received by producers in the pre-war and war years. This low price has remained in force up to the 1943–44 crop in anticipation of an unmarketable surplus which was never realized.

The decrease in world production is ascribed to other causes also:—

(*a*) the diversion of manpower from agriculture to other works and services during the war;

(*b*) the diversion of labour at more remunerative rates to other work;

(*c*) the ravages of "Swollen Shoot" and *Sahlbergella* maladies in West Africa which have contributed materially to the 20 per cent to 30 per cent shrinkage of production in the area.

No attention has been drawn by Mr. McFall to several other considerations which have no doubt assisted in the falling off in production. The original West African cacao plantings are generally reaching an age where yields per acre fall off due to senility. The replanting and/or supplying of established fields have no doubt been handicapped by low returns not only in West Africa but in the West Indies in the pre-war period. The bulk of the West Indian production, small as it is, has been adversely affected by "Witches' Broom" disease.

The demand for cocoa products is governed mainly by the standard of living of the industrial classes. A higher standard will inevitably increase demand. There has been a 20 per cent increase in consumption in the United States of America since the outbreak of war and everywhere an increased demand is apparent. Further if the Russian nation develops a liking for cocoa, the potential demand becomes so much greater. Manufacturers are concerned therefore with the falling off in production which, as has been pointed out, is due mainly to low prices which are due to Government control since the outbreak of war and to disease.

The price of beans to West African producers rose from about £13 per ton to about £23 per ton for the 1943–44 crop. The producer may require further encouragement as there is no doubt that present restrictions are

opposed to the immediate economic interests of producers and probably to the ultimate interests of manufacturers.

The effects of unduly high or low prices are reflected invariably in production about ten years later. To-day, the production in cocoa countries is suffering from the slump of 1933–34 period. The policy adopted for the first three to four years of the war has no doubt aggravated the position. The low prices obtained will not have encouraged planting and regular supplying in producing areas as they were not sufficiently remunerative.

If the anticipated vastly increased demand for cocoa is to be met, it is essential to restore the impetus and progressive character of existing producing areas, to develop new areas and to maintain a fair and remunerative price level. This involves adequate research into the culture, processing, control of disease and pests, marketing and the application of such research as well as the survey of potential areas of cultivation.

Further, it is necessary that cocoa and chocolate products, of which cocoa butter is a by-product, be legally defined to safeguard the interests of producers.

Finally, it is suggested that the sooner the present system of control is abolished, the sooner will the cocoa trade, as a whole, resume a healthy progressive condition. Safeguards may be needed. In consuming countries an agreed ceiling price might be sufficient to prevent markets getting out of hand. In producing countries a compensating guarantee of a minimum price might be sufficient protection to both consumers and producers during the post-war period of readjustment. M.D.FF-M.

Crown Colonist. September 1944.

DEPARTMENTAL NOTES.

THE appointment of the Senior Agricultural Officer, Mr. C. Harvey, as Director of Agriculture has met with general approval throughout the Colony and readers of the *Journal* were glad to hear of his well-earned promotion.

Another appointment, this time on a three year secondment, is that of the Senior Veterinary Officer, Mr. C. R. Turbet, who has gone to Ceylon as Specialist in Animal Husbandry. Durng his twenty-two years in the Colony Mr. Turbet has made a large circle of friends who will wish him a happy tour in his new island home. He will be greatly missed in the Department.

Lieutenant-Colonel A. B. Ackland, E.D., Inspector of Produce, who has been absent from the Department on military service since 1942, has accepted the appointment on secondment of Land Agent under the Native Lands Trust Board, Fiji. Lieutenant-Colonel Ackland has left Fiji for the United Kingdom where he will study estate agency methods.

Readers who remember Dr. T. H. C. Taylor—who did such useful work in the *Levuana* and *Promecotheca* campaign—will be pleased to learn of his transfer from Uganda (where he was serving under Dr. J. D. Tothill) to the Imperial Institute of Entomology, the central Empire clearing-house for insect identification, which is in the British Museum (Natural History), London.

BRITAIN'S BIGGEST SINGLE INDUSTRY.

"But why all the grass?" That was the searching question put to me and a group of British farmers, some time before the war, by a German agriculturist after he had toured our farm lands.

Not only in the dairying countries, where pasture would naturally predominate, but all over England there were miles upon miles of it; fertile farms—among the most fertile in the world—were little more than cattle-exercising grounds.

Let us suppose that the same German agriculturist visited Britain to-day. He would see the results of nothing less than a revolution, a revolution that can be seen by the eye for it is painted in vivid colours.

On the rich, black soil of East Anglia, the red soil of Shropshire or Devon, even on the heavy clays of "the sodden Midlands," the plough has turned in the grass, making a chequered scene of brown fields and, here and there, the field which is growing grass of improved quality for livestock needs.

The revolution that has taken place is simply this: Britain, a highly-industrialised, food-importing country with a decadent agriculture has, in five years, put herself in the vanguard of farm achievement. She produces enough from her own soil to feed the population for more than two out of three days. In peacetime there was grown here only enough food for one day out of three; the rest was imported.

You see now why I call it a revolution. Agriculture is again Britain's biggest single industry. Its turnover is something like £500,000,000 a year compared with little over half that before the war. A million British families get their living from the soil.

We have not talked much about this great change in the face of Britain. In fact, until quite recently, the figures of this astonishing performance had been kept secret. Now, Mr. Hudson tells us, the grain and potato acreage—and even the number of cattle—have in five years been raised to the highest level since the "prolific 'seventies" of the last century.

I do not want to give many figures but a few will help to prove what I say. The wheat acreage last year was 82 per cent above pre-war figures, barley was up by 89 per cent, and oats were 64 per cent higher. The acreage of potatoes has been doubled.

The importance of this to Europe is that, by maintaining our maximum effort, Britain will avoid any heavy call upon world supplies needed for feeding Europe during the critical period immediately after the war before the farms on the Continent can be got into production.

To win this Battle of the Land it was necessary to have a plan of campaign, millions of tons of machines, great armies of workers.

First, the plan. In every county, a war agricultural committee—all volunteers, mark you—was appointed. These committees, on which employees sit as well as employers, had a survey made of every field—the Domesday Book brought up to date.

The fields were classified for fertility, soil types, climatic peculiarities and so on. The farmers—sort of commanders in the field for this battle—were told what crops they were to grow and where.

This bit of organization proved irksome at first to the farmer—he is an independent chap by nature—but it was soon realized that planned cropping was essential to victory and the farmers gave of their best.

Next, the machines. For the ploughing-up campaign, tractors—thousands of them—were essential. British factories could turn out only a limited number, and it was here that the United States stepped in.

Our ally, in the same way that she shipped millions of tons of material to the war theatres, sent tractors to the Ministry of Agriculture. From 50,000 tractors at work in 1939 the number has risen to about 150,000 to-day—three times as many ; and Britain is now leading the world in farm mechanization.

And, finally, the labour. Here let me say straight away that none of this colossal food production campaign would have been possible without the Women's Land Army. What a job they have done for England ! More than eighty thousand girls from city offices, shops, and factories answered the call to work twelve or fourteen hours a day in all weathers.

They filled the jobs of fifty thousand skilled workers who left the farms of Britain to fight on land, on sea, and in the air.

Many of the girls in the south-eastern part of England have themselves had a frontline job, working on, with only the protection of a tin hat, through German shelling and German bombing.

But all of them, in whatever part of Britain they worked, have played a glorious part in the story of Britain's revolution on the land—a revolution which already has an assured place in history, and one which is to put food into the mouths of untold hungry men, women, and children of a war-torn Europe. Thus has come about the re-birth of a great British agriculture.

This, again, is important to Europe. Britain can no longer be regarded as a nation mainly concerned with industry, finance, and shipping. Because we have a virile and prosperous agriculture, we share the interests and problems of many European countries.

—G. Eley in *London Calling*, October 26, 1944.

CASTOR BEAN INSECT SPRAY.

Long talked about as a source of insecticides, the castor bean plant has finally been proved practical for this purpose. A spray carrying castor toxins, of which the active element is ricin, is being used on citrus fruit crops in the U.S. southern state of Florida.

Reports from a large growers' association with 30,000 acres of groves and from other Florida groves show that the castor spray is effective in control of various kinds of scale insects. On purple scale they have resulted in a kill ranging from 88.4 per cent to 93.5 per cent ; on red scale, from 90.5 per cent to 97 per cent. Combined with cryolite, the castor spray has shown promise in control of vegetable insects.

Boosters for the castor insecticide also claim growth stimulation of plants to which the material is applied. A potato grower in Maine, after using castor spray on his 1943 crop, reports that he had control of net necrosis. He also reported that the plants did not blight, and that he had earlier maturity and higher yields of the crop. His crop averaged 166 barrels per acre on 50 acres.

—*U.S. Highlights.*

FORESTS AND COLONIAL AGRICULTURE.

Impoverished Soils.

THE Anglo-Saxon races, observes Prof. E. B. Stebbing, of the University of Edinburgh, in an article in *Nature*, have shown lack of appreciation of the value of the forest to agriculture. In the Colonies, British administrations have been guilty of an error of judgment in the rigid application of the early introduced rule that all interference with the local practices, habits and customs of the people was deprecated and would not be countenanced. Consequently such common practices as shifting cultivation, firing of the countryside in the hot season and unrestricted grazing by herds of stock, increasing with amazing rapidity under the *Pax Britannica*—all these practices continued unchecked in the form found when the country was taken over. The inevitable results were not foreseen or the dangers even appreciated.

Prof. Stebbing continues : "A great deal has been heard recently of the attempts to improve agricultural methods in the Colonies. In the past, every effort was made to improve the commercial and financial position—the so-called development of the Colony—by the introduction and growth of crops of tea, coffee, cocoa, sugar, rubber and so forth, all at the expense of the forest, for the development was made by the large-scale felling of the most valuable, beause the richest in commercial timber species, of the forest areas. For a time, all went well. Wealth came to the Colony and the planters, while the natives continued their old practices of shifting cultivation, etc., in the rest of the accessible forests. But the rich forest soil, the product of centuries of conservation under the canopy of the trees, gradually became used up and dissipated when exposed, for little protection was afforded to it by the crops grown. We are now facing the consequences.

The administrations still appear to regard it as a purely agricultural matter. More research, it is said, will lead to a better because more intensive agriculture. Is this a logical conclusion because, in isolated instances, a Colonial Agricultural Department can show, on a small scale, the example of a success ? In Africa it is beyond question that the soil of the continent is becoming increasingly impoverished by the very means by which great tracts of that old continent have become reduced to desert conditions or practically desert conditions, by man in the past."

—*Crown Colonist*, Oct., 1944.

NEW JAPANESE FOOD.

Mould, Sawdust, Starch and Sun.

JAPANESE food chemists have been decorated for inventing a new food concocted of mould on rotting wood plus sawdust and starch which when fermented is seasoned with sunshine, says Tokio official radio. The broadcaster said the product is edible when mixed with flour to make noodles. Another invention mixes nitrogen with germs producing albumen for bread baking. A third invention reduces the food's weight needed by a soldier to one-tenth and the volume to one-eighth. He added that persons who eat this for a week digest it so completely that there is no waste and they no longer complain of hunger.

APPLICATIONS OF DDT.

DR. ANNAND concludes that DDT is " one of the more promising synthetic organics " for the control of insects—a sober statement which should be borne in mind in these days when publicity is apt to exalt new discoveries far beyond the claims made for them by scientific workers. A reaction of some insects suggests, Dr. Annand says, that it acts as a nerve poison. It is distinctly toxic when it is dissolved in solvents such as oil, which can penetrate the skin, or when it is ingested ; and more work is needed on its toxicity to man and animals. Appropriate precautions should therefore be taken by personnel who employ it as a dust likely to be inhaled or swallowed or in oily solvents. But in the concentrations in which it has been used for the control of human lice, it is apparently safe if reasonable precautions are taken ; in these concentrations it does not appear to irritate the human skin.

For the control of the larvæ of malaria-carrying mosquitoes it is being tried as an emulsion sprayed over waters containing them, and the method of spraying it from the air is also being tried in an attempt to kill mosquitoes infected with malaria in areas in which troops have to operate. For the control of some species of cockroach it certainly seems to be effective.

DDT may, according to this article, partly replace pyrethrum in the aerosol " bombs " widely used by the United States Army for the disinfestation of tents, aeroplanes, buildings, etc. (But Mr. Lyttelton has announced in Parliament that the entire output of DDT is being taken for military use and that, apart from a small quantity released for use in air-raid shelters, none can be released for civilian use.)

It is clear that DDT will have many uses other than the control of the lice which transmits typhus. Field tests should be made on its action on such insect pests of domesticated animals as the blowfly and the lice of mammals and birds. It might even prove useful against human scabies and the scab mites of animals. But we must not expect too much of it. Local factors in the environment will always affect the action of even the best insecticide. It is one thing, for example, to kill 100 per cent of houseflies or mosquito larvæ with DDT or any other substance in the laboratory, and quite another to kill these quickly on a large scale in a tropical area where they are causing the deaths or illnesses of large numbers of human beings ; or to do the same thing among populations whose normal habits, or disorganization during disaster, stultify the best of sanitary plans ; or to apply such a remedy to large herds and flocks of domesticated animals or to extensive crops in the spacious area of America or Australia. All remedies of this nature are subject to this kind of limitation.

—G. LAPAGE.

—*Nature*, No. 3915. November 11, 1944.

HARVEST HOME.

ESTIMATED production of the principal crops in England and Wales in 1944 shows the following huge increases over 1939 : Wheat, 90 per cent ; barley, 90 per cent ; oats, 64 per cent ; potatoes, 105 per cent. Subsidies and hard toil, including much splendid work by the women, have done this. There has been a fall in the production of livestock, which suffered gravely from the lack of imported feeding stuffs. Our diet has become plainer, but more home-grown than ever before. When peace returns there will be a change of crops and methods. There will be more reliance on milk, milk products, meat, vegetables and other goods where home production has decided advantages over overseas production.

—*Observer*, 18th October, 1944.

MIMOSA, A BOMB-SENSITIVE PLANT.

THE mode and origin of movement in sensitive plants have been most studied in *Mimosa pudicans*, and an agreement about them has tentatively been reached. It was at first surmised that the *Mimosa* had a nervous system to be disturbed, but this is not the fact. Consider what happens. When a single pinnule is stimulated by a gentle touch, the responsive movement takes place in the opposite pinnules almost instantly. The pairs of leaflets fold their upper surfaces together, and their midribs or pinnæ, converge while the petiole or leaf-stalk, falls into a pendent position. A more intense stimulus, such as wounding a pinnule, is transmitted to greater distances and if the plant is in a highly irritable state the impulse will psss through the stem to neighbouring leaves. Halberstadt, examining *Mimosa's* anatomy, ascribed this to the existence of a system of tubes, containing sap, through the plant stems to the main leaf-stalks, thence to sub leaf-stalks and to the pinnules. He maintained that the disturbance from the leaves travelled through these tubes much as a wave pressure can be sent through a tube filled with water.

This explanation has been modified. At the base of the leaves, where their midribs meet the leaf-stalk, are small, swollen dark bodies, the pulvini. Inside them plant tissue is massed, and when this is stimulated the cells on one side lose their power of holding the watery sap, so that on that side the pulvinus shrinks. As it acts as a joint, or hinge, then on the side of the shrinkage the leaf-stalk falls. The disturbance which set the pulvinus in motion travels onward, and the suggestion is that if the first shock given to leaf or stalk or stem be severe enough, such, for example, as a cut, it is not a physical impulse that travels, but a chemical one. In the same way a cut on a finger summons chemical bodies in the blood to deal with it. This chemical explanation is not entirely acceptable ; the path of the conduction is still in doubt but as an explanation it, at present, holds the field.

—E. S. GREW in *The Illustrated London News*, Oct. 28, 1944.

PENICILLIN AND PLANTS.

CROWN gall, a disfiguring and destructive disease of plants that is often called plant cancer, has been cured with penicillin in the plant pathology laboratories of the University of Arizona by Professor J. G. Brown, head of the department. Crown gall is caused by a bacteria species, differing in this respect from human and animal cancers which it resembles in many other ways. So far as known, human and animal cancers are never directly produced by bacterial attack. Regardless of whether or not Professor Brown's discovery proves to have significance in the fight on human cancer, it promises practical results in the immediate field of plant pathology.

This disease is known to attack at least a hundred kinds of plants, and is an especially destructive enemy of young shrubs and trees in nurseries and orchards. The crude penicillin extract used in the experiments successfully cured the soft type of crown gall. It cost two cents per quart, and a quart is sufficient to destroy many small galls.

—*Science*, October 27, 1944.

FRUIT EXPORTS.

Banana Exports Increase.

THE following items of produce were exported overseas during the past two months :—

Bananas.—January : 4,724 cases ; February : 6,739 cases.

Other fruits.—January : 157 cases ; February : 8 cases.

Water melons.—January : 783 fruits ; February : 288 fruits.

Green ginger.—January : 9 cwt. ; February : 20 cwt.

Peanuts.—February : 6 bags.

Bananas are now coming forward more freely and the quality, particularly of the last shipment, showed great improvement, indicating that growers are taking some interest in replanting. The pineapple and water melon season is practically finished. Prospects for the citrus season are at the moment uncertain.

—*Fiji Times & Herald*, 9th February, 1945.

HEAT FOR INSECT CONTROL.

A group of U.S. agricultural engineers has undertaken the solution of a serious problem for Latin American farmers—the killing of insects in stored corn without the use of fumigants. The average loss from uncontrolled insects in corn stored on Latin American farms runs as high as 50 per cent and farmers are finding it difficult to obtain the chemicals needed to eliminate the pests. Corn is an important food crop throughout the South American republics.

The experimental method involves the use of heat on shelled corn stored in a brick structure about six feet wide and 14 feet high which holds about 160 bushels of corn. The 120 degrees Fahrenheit of heat needed to kill the insects is provided by a wood furnace with a flue passing through the centre of the building.

—*Science.*

VITAMIN B REPELS MOSQUITOES.

DRAMATIC results have been obtained in the treatment of individuals severely affected by mosquito bites, according to reports in a recent issue of *Minnesota Medicine*, an American publication. Tests showed that heavy initial doses of thiamin chloride, followed by smaller regular doses, not only reduce itching, but actually make the individual repellent to mosquitoes. One case history was that of a man abnormally affected by mosquitoes. Before a fishing trip, he took three 40 mg. doses of thiamin. While other members of his party were bitten ferociously, he was bitten but a few times and none of the bites were troublesome. Size of dosage in other cases varied widely, depending on the individual treated.

ERRATA—Vol. 15, No. 3, Sept. 1944, p. 78, final paragraph. Transpose *Spondias* for *Pometia*.
Vol. 15, No. 4, Dec. 1944, p. 95, under " Drugs, I—Medicinal ", paragraph 3, line 3. Delete " esters are " and insert " is ".